

CLAIMS

What is claimed is:

1. A method for preparing a protected article, comprising the steps of
providing the article;
depositing a bond coat onto an exposed surface of the article; and
producing a thermal barrier coating on an exposed surface of the bond coat, wherein
the step of producing the thermal barrier coating includes the steps of
depositing a primary ceramic coating onto an exposed surface of the bond
coat, and
depositing a stabilization composition onto an exposed surface of the
primary ceramic coating, wherein the stabilization composition comprises a first element
selected from Group 2 or Group 3 of the periodic table, and a second element selected from
Group 5 of the periodic table, and wherein the atomic ratio of the amount of the first
element to the amount of the second element is at least 1:3.
2. The method of claim 1, wherein the step of providing the article includes the
step of
providing the article as a nickel-base superalloy article.
3. The method of claim 1, wherein step of providing the article includes the
step of
providing the article in the form of a component of a gas turbine engine.
4. The method of claim 1, wherein the step of depositing the bond coat
includes the step of
depositing a diffusion aluminide or an aluminum-containing overlay bond coat.
5. The method of claim 1, wherein the step of depositing the primary ceramic

coating includes the step of

depositing yttria-stabilized zirconia as the primary ceramic coating.

6. The method of claim 1, wherein the step of depositing the stabilization composition includes the step of

providing the first element selected from the group consisting of lanthanum, neodymium, and cerium.

7. The method of claim 1, wherein the step of depositing the stabilization composition includes the step of

providing the second element selected from the group consisting of tantalum and niobium.

8. The method of claim 1, wherein the step of depositing the stabilization composition comprises the step of

depositing the stabilization composition selected from the group consisting of lanthanum and tantalum, neodymium and tantalum, lanthanum and niobium, neodymium and niobium, and cerium and tantalum.

9. The method of claim 1, wherein the step of depositing the stabilization composition includes the step of

co-depositing the first element and the second element.

10. The method of claim 1, wherein the step of depositing the stabilization composition includes the step of

co-depositing the first element and the second element from a liquid solution.

11. The method of claim 1, wherein the step of depositing the stabilization composition includes the step of

depositing the stabilization compound such that the atomic ratio of the amount of

the first element to the amount of the second element is at least 1:1.

12. A method for preparing a protected article, comprising the steps of providing a nickel-base superalloy article that is a component of a gas turbine engine;

depositing a bond coat onto an exposed surface of the article; and

producing a thermal barrier coating on an exposed surface of the bond coat, wherein the step of producing the thermal barrier coating includes the steps of

depositing a yttria-stabilized zirconia primary ceramic coating onto an exposed surface of the bond coat,

infiltrating a stabilization composition into an exposed surface of the primary ceramic coating, wherein the stabilization composition comprises a first element selected from Group 2 or Group 3 of the periodic table, and a second element selected from Group 5 of the periodic table, and wherein the atomic ratio of the amount of the first element to the amount of the second element is at least 1:3.

13. The method of claim 12, wherein the step of depositing the primary ceramic coating includes the step of

depositing yttria-stabilized zirconia having about 7 percent yttria by weight.

14. The method of claim 12, wherein the step of depositing the bond coat includes the step of

depositing a diffusion aluminide or an aluminum-containing overlay bond coat.

15. The method of claim 12, wherein the step of infiltrating the stabilization composition includes the step of

providing the first element selected from the group consisting of lanthanum, neodymium, and cerium.

16. The method of claim 12, wherein the step of infiltrating the stabilization

composition includes the step of

providing the second element selected from the group consisting of tantalum and niobium.

17. The method of claim 12, wherein the step of infiltrating the stabilization composition comprises the step of

deposition the stabilization composition selected from the group consisting of lanthanum and tantalum, neodymium and tantalum, lanthanum and niobium, neodymium and niobium, and cerium and tantalum.

18. The method of claim 12, wherein the step of infiltrating the stabilization composition includes the step of

co-depositing the first element and the second element.

19. The method of claim 12, wherein the step of depositing the stabilization composition includes the step of

depositing the stabilization compound such that the atomic ratio of the amount of the first element to the amount of the second element is at least 1:1.

20. A method for preparing a protected article, comprising the steps of providing the article;

depositing a bond coat onto an exposed surface of the article; and

producing a thermal barrier coating on an exposed surface of the bond coat, wherein the thermal barrier coating comprises

a primary ceramic coating on the exposed surface of the bond coat, and

a sintering-inhibitor region at a surface of the primary ceramic coating,

wherein the sintering-inhibitor region comprises a first element selected from Group 2 or Group 3 of the periodic table, and a second element selected from Group 5 of the periodic table, and wherein the atomic ratio of the amount of the first element to the amount of the second element is at least 1:3.